Office Memorandum • UNITED STATES GOVERNMENT

TO : DD/I

DATE: 15 September 1958

FROM : Acting AD/RR

SUBJECT: Comments on "Survey of the Soviet Machine-Tool Industry" by Joseph A. Gwyer

The attached comments are forwarded in response to your request.

STAT

Attachment:
Subject comments
(Orig. and 2)

Comments on
"Survey of the Soviet Machine-Tool Industry"
by
Joseph A. Gwyer

We found Mr. Gwyer's survey to be an interesting compilation of Soviet sources in this field. We have used these, and many other, open sources in our own analysis of the Soviet machine tool industry.

We disagree with some of the author's interpretations of Soviet data. We feel that his remarks on quality of Soviet machine tools are unduly critical, occasionally contradictory, and in some cases inaccurate. We believe that the quality of machine tools currently being produced in the USSR is adequate for the purposes for which they are to be used. These machines are usually lacking in frills, eye-appeal, and finish but are capable of producing accurate products without excessive downtime. The author's assumption that Soviet statistics on machine tool production include up to 25 percent "service-shop" sizes (page 21) is considered inaccurate. The US production figures for 1952 and 1955 quoted by the author contain a greater number of this type of equipment than the official Soviet figures for these years. More detailed comments are presented below.

Import figures for the years listed in Table II are not available from official Soviet statistics but are considered probably accurate. The import figure of 21,745 units for 1941-44 in Table IV is too low. We estimate it to be more than 50,000 units.

The compilation of statistical data on production is accurate for the years reported on by the Soviets in their handbooks. The estimated production of 84,000 units for 1941-44 in Table IV is considered too low. Production for these years is estimated to be at least 100,000 units.

The author has not proved his assertion on page 11 that Soviet statistical data is misrepresented. The so-called 367,571 units unaccounted for in the author's calculations in Table IV are almost all explained away logically on page 12 by his own statement that they were probably mostly "war-reparations," and that the balance were imports from Bloc countries. We estimate "war-reparations" to have been a minimum of 250,000 units and production and imports for 1941-44 to be greater than the author has estimated. We, therefore, accept the reported Soviet inventory figures as probably true.

The author reports US production in 1952 as 230,000 units (page 13) and in 1955 as 106,000 units (page 20). Although accurate US statistics on US production of machine tools are not available, we consider the figures quoted in this report as too high. The NMTBA (National Machine Tool Builders Association) reports production by its members to be 96,800 units for 1952 and 50,500 units for 1955. Various sources estimate that the members of this organization produce 70 to 85 percent of all US machine tool production. The author's statistics on US production originate from the Bureau of Census. Our analysis of these figures leads to the conclusion that a large portion of the production reported by Census is not comparable to the Soviet types produced in the corresponding years, 1952 and 1955. For example, the Bureau of Census figure includes 37,460 units valued at $1,812,000, or less than $50 each. They are bench grinders, Sears-Roebuck type, and are not included by the Soviets or NMTBA as machine tools, but are suitable for use in home workshops, service-shops, and garages. This category, the author states (page 20), is excluded from the 106,000 units he reports as produced by the US in 1955.

The inclusion of photos of Soviet machines displayed at the Brussels Fair in part refutes the author's statement (page 21) that current Soviet models approach US equipment produced up to and during World War II. For example:

Model 6N12P, page 15 (seen by one of our industrial analysts at the Fair; the correct model number is 6N13PR)--a magnetic tape-controlled, three-dimensional milling machine working through a transistorized digital computor. Comment: This item is not outdated by anything the US has to date.

Model 6M42P, page 17--a two-dimensional profile milling machine controlled by a punched tape. Comment: as modern as 1958 models in the US.

Model 262PR, page 17--a horizontal boring mill with table and head coordinating functions, and speed and feed settings controlled by punched cards. Comment: again, a modern concept in the US.

Model 5833, page 18--a semi-automatic gear grinding machine incorporating a principle originating in Swiss machines. Comment: relatively new even in the US, having been produced here only since the Korean War.

The examples given above indicate that the best Soviet models are on a par with, or are very close to, US first-quality machines. All Soviet production, of course, does not consist of the most modern types, and many can be considered obsolescent by US standards.

The author contends (page 22) that total productivity of the current annual production of machine tools in the US exceeds by 50 percent that of current Soviet annual production. We estimate that current annual Soviet production of machine tool units is greater than that of the US, and the total productive capacity of the machine tools must be considered at least equal to that of US annual output. The Soviets have probably surpassed the US in the use of ceramic tools, which far exceed the tungsten carbide cutting speeds. The author mentions US advances through the use of tungsten carbide tooling (page 21), but the USSR has also advanced in this field, even if not to the same degree.

ORR/CIA
12 September 1958

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Remarks:

Particularly on the remarks on quality and inclusion of "service shop" sizes in statistics RAh - 15 Sept 58
comments attached

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EXECUTIVE OFFICE OF THE PRESIDENT
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WASHINGTON

September 3, 1958

MEMORANDUM FOR MR. ROBERT AMORY, CIA

Mr. Gray has asked me to send you the attached unclassified paper by Mr. Joseph A. Gwyer, a member of the staff of the Library of Congress, entitled "Survey of the Soviet Machine-Tool Industry". The paper which was given to Mr. Gray by a friend, is scheduled to be published in the November-December issue of Ordnance, the magazine of the American Ordnance Association. Perhaps your people will find it of value if they have not already received it through other channels.

James S. Lay, Jr.
JAMES S. LAY, JR.
Executive Secretary

cc: Mr. Gray

SURVEY OF THE SOVIET MACHINE-TOOL INDUSTRY

by

Joseph A. Gwyer

Declassified in Part - Sanitized Copy Approved for Release 2014/01/15 : CIA-RDP86T00268R000800110043-7

Nov-Dec. issue of Ordnance, magazine of the American Ordnance Association JAF

SURVEY OF THE SOVIET MACHINE-TOOL INDUSTRY

by

Joseph A. Gwyer

Introduction. Machine tools are of central importance to the achievement of military capability. That the Russians have substantially improved their ability to produce weapons of war is attested by the fact that currently the Soviets are producing more than 130,000 machine tools annually. While granting that the Soviets have made impressive progress, it would be as ill-advised to overestimate this progress as to underestimate it. It may be helpful, then, to assess where the Soviets stand.

Obviously, a comprehensive survey would require extensive analysis of classified as well as unclassified sources. However, a review of unclassified literature does provide a wealth of worthwhile information about Soviet machine tool resources.

This paper is a preliminary survey of unclassified literature and attempts to present (a) a historical survey of the Soviet machine-tool industry; (b) data on imports and domestic production of machine tools since 1932, as well as data on the status of Soviet machine-tool inventories; (c) some of the engineering aspects of the industry, e.g. data on types of tools, extent of automation, and characteristic features of some tools; and (d) general observations based on the above data. This survey is based on unclassified Soviet literature available to anyone willing to consult the references of the Library of Congress. The reported production figures

are those quoted by official Soviet governmental agencies, and should be considered as "reported" and not necessarily as attained.

Historical Survey. The branches of the engineering industries producing machine tools were weakly developed in pre-1917 Russia. Consequently, the demand for tools was basically met by imports of tools from abroad. The economic and industrial recovery from the effects of World War I and the Civil War during the era of New Economic Policy instituted in 1921 and which attempted to retain Communism only as the principle of government imposed new demands on whatever industrial establishment were not affected by the ravages of war. As of 1925, machine tools were manufactured by the Moscow plant "Samotochka," the Kuybyshev (former city of Samara) Middle Volga plant, Odessa plant im. Lenin, Izhevsk and Tula ordnance plants, Leningrad plant im. Il'ich, Yegor'yevsk plant "Komsomolets," and few others. 1/

In April of 1929, the XVI-th Conference of the Communist Party officially accepted the First-Year Plan (FYP) for the development of the national economy. Among the considerations discussed at the conference was conversion within a shortest possible time of the machine-tool building industry from a "narrow and shaky" base into a powerful technical base that could be in position to serve the overall needs of expanding Soviet industry. 2/ A governmental decree of 1929

1/ "Sovetskoye stankostroyeniye k 40-letiyu velikoy Oktyabr'skoy sotsialisticheskoy revolyutsii," in Stanki i Instrument, v. 28, no. 10 (Oct. 1957) p. 1

2/ Ibid. p. 1

created the "Stankotrest" (Machine Tool Trust) which comprised the following machine-tool building plants: Moscow's "Krasnyy proletariy," Leningrad plant im. Sverdlov, "Dvigatel' revolyutsii," "Samotochka," "Komsomolets," and the Kuybyshev Middle Volga plant. The organization of the "Stankotrest" marked the creation of an independent branch of the U.S.S.R. industry, solely concentrating on production of tools. A new trust called "Soyuzstankoinstrument" which also embraced the production of cutting tools was subsequently reorganised into a All-Union Association. 3/ In the course of 1932 the following two new plants were added to the industry: the Moscow machine-tool plant im. Sergo Ordzhonikidze and the Gorkiy plant for building milling machines. 4/

ENIMS (Eksperimental'nyy nauchno-issledovatel'skiy institut metallorezhushchikh stankov--Experimental Scientific-Research Institute for Metal Cutting Tools) was organized in 1933 and its primary function was to carry out scientific research for the entire machine-tool building industry of the U.S.S.R. 5/ Among its tasks was to determine the most suitable types of machine tools for Soviet industry, designing of new tools, etc.

During the Second FYP, the following plants were added to the growing roster of machine-tool building plants: the Kharkov plant

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3/ Berri, L. Ya., Spetsializatsiya i kooperirovaniye v promyshlennosti SSSR, Moscow, Gospolitizdat, 1954, p. 244
4/ "Sovetskoye..." op.cit., p. 2
5/ Omarovskiy, A., Sovetskoye stankostroyeniye i ego rol v industrializatsii strany, Moscow, Akademiya Obshchestvennykh Nauk pri TsK VKP(b), 1948, p. 60

for drilling and grinding tools, the Kiyev plant im. Gorkiy for automatic machine tools, the "Stankokonstruktsiya" plant, the plant im. Kirov in Tbilisi, and the Saratov plant for gear-cutting machine tools (an experimental shop). A directive of the Presidium of the Supreme Soviet of the U.S.S.R. dated as of September 4, 1939, transferred a group of locally administered plants in the White Russian S.S.R. into the larger nation-wide complex of machine-tool building plants. 6/ The newly constructed Kramatorsk plant for heavy machine tools entered the complex in 1939.

The directive of the Central Committee of the All-Union Communist Party and of the Council of National Commissars of the U.S.S.R. blueprinted on December 8, 1940, a program for the reconstruction of existing plants and construction of twenty-five new machine tool plants and six plants for related production, and also for conversion to machine tool production of numerous other plants. 7/

In order to carry out the December, 1940, resolutions regarding the further development of the machine tool industry, the government created in May of 1941 the Ministry for Machine Tool Construction (Narodnyy Komissariat Stankostroyeniya Soyuza SSSR), which united all specialized enterprises engaged in production of machine tools, press-forging equipment, cutting tools, and abrasives. During World War II, in connection with the evacuation of machine tool building

6/ Omarovskiy, A., Sovetskoye stankostroyeniye i ego rol v industrializatsii strany, Moscow, Akademiya Obshchestvennykh Nauk pri TsK VKP (b), 1948, p. 64

7/ "Sovetskoye..." op.cit., p. 2

plants into the eastern regions of the U.S.S.R., the following new centers were added to the industry: Alapayevsk, Sterlitamak, Troisk, Kizel, Sol'-Iletsk, and others.

During the 1946-50 period, all war-damaged plants were rebuilt and existing plants were reconstructed. A new plant for heavy machine tools at Kolomna entered production during this period of reconstruction.

The shift in the geographical distribution of machine tool production since 1940 can be seen in the following table:

TABLE I

PRODUCTION OF MACHINE TOOLS BY REGIONS, 1940, 1950-55 (in units)

Region Year	1940	1950	1951	1952	1953	1954	1955
RSFSR (total)	39,500	49,500	48,200	49,200	62,100	69,200	76,400
North-West	2,553	2,343	2,298	2,630	4,160	4,048	5,161
Center	27,200	21,000	21,200	21,700	27,600	32,600	34,500
Volga Area	4,400	6,400	6,800	6,700	6,600	7,500	8,700
North Caucasus	1,362	4,561	4,630	4,904	7,442	8,282	10,251
Urals	2,600	11,600	9,200	9,000	11,400	12,700	12,100
West Siberia	1,382	3,354	3,860	3,970	4,566	3,691	4,562
Ukrainian SSR	11,700	10,500	10,400	12,100	12,900	14,000	14,400
White Russian SSR	6,000	4,800	6,000	6,300	7,700	9,000	11,200
Georgian SSR	803	2,481	2,721	2,757	2,897	3,290	3,942
Lithuanian SSR	---	1,247	855	960	1,789	2,034	5,226
Kirghiz SSR	110	630	725	531	706	860	1,148
Armenian SSR	---	904	1,289	1,540	1,841	2,120	2,773

Source: Tsentral'noye Statisticheskoye Upravleniye pri Sovete Ministrov SSSR, Promyshlennost' SSSR, Statisticheskiy sbornik, Moscow, Gosstatizdat, 1957, p. 55, 60, 62, 64, 65, 66, 68, 72, 81, 85, 91, 95.

From the total number of machine tools produced in 1955, Siberia and the Urals accounted for 14.9 percent, Industrial Sourth for 12.8 percent, northern Caucasus and Transcaucasia for 14.5 percent, western European regions of the U.S.S.R. for 14.6 percent, Lower Volga regions for 7.4 percent, and Central regions for 29.5 percent of total.

Imports and Soviet domestic production of machine tools. The production of machine tools was organized almost entirely during the First FYP. 8/ Prior to the outset of the First FYP, such equipment had to be imported from abroad, as it was customary prior to the outbreak of World War I. 9/ The XIVth Congress of All-Union Communist Party, held in December of 1925, in search of solutions to the critical problem of industrial underdevelopment, decided to support the principle of industrialization at any cost. Since engineering industry was weakly developed in Russia and its recovery had lagged behind that of most other industries as a consequence of the Civil War, it was decided that the output of Russian machine tools was to be supplemented by import of machine tools from abroad.

The magnitude of imports of metal working equipment, especially that for machine tools, compared with domestically produced equipment, can be seen from the following table:

8/ Ts.U.N.Kh.U., Gosplan SSSR, Summary of the Fulfillment of the First Five-Year Plan for the Development of the U.S.S.R., Moscow, Gosplan, 1933, p. 76-77

9/ Bakulin, S. N. and D. D. Mishustin, Vneshnyaya torgovlya SSSR za 20 let, 1918-1937, Moscow, Mezhdunarodnaya kniga, 1939. p. 79-80

TABLE II

IMPORTS AND DOMESTIC PRODUCTION OF MACHINE TOOLS

	Imported	Domestically Produced
	(1)	(2)
Year	No. of machine tools	No. of machine tools
1923-1927	15,524	7,387
1928	5,323	2,697
1929	6,042	4,617
1930	11,352	8,199
1931	18,269	12,846
1932	68,950	19,720
1933	23,730	21,000
1934	18,397	25,400
1935	12,435	33,900
1936	4,888	44,400
1937	4,790	48,473

Sources: Column (1), 1923-37, Omarovskiy, op.cit., p. 50; column (2), 1923-31, Ibid., p. 65; column (2), 1932-37, Ts.S.U., Promyshlennost'...1957, p. 207-209

Beginning with 1938, imports of machinery in general, and machine tools in particular, declined to relatively low levels. This decline in imports is attributable to the development of a domestic industry largely capable of supplying the Soviet industry with adequate numbers of machine tools as it is evident to some extent from the following table:

TABLE III

ANNUAL PRODUCTION OF MACHINE TOOLS BY CATEGORIES
(in units)

Category	Year 1932	1937	1940	1945	1950	1951	1952	1953	1954	1955	1956	1957
Metal Cutting Machine Tools (Totals	19,978	48,473	58,437	38,419	70,597	71,182	74,558	91,759	102,362	117,087	121,300	130,000
Lathes	7,145	15,202	11,523	13,063	24,140	23,142	23,853	27,384	29,507	31,292		
Turret Lathes	512	1,806	2,088	2,920	1,402	1,583	1,684	2,010	2,378	2,825		
Semi-automatic & automatic lathes		894	2,038	419	863	981	1,129	1,237	1,152	1,524		
Milling	1,068	3,243	3,701	1,353	3,857	3,827	4,287	5,022	6,404	7,339		
Gear-cutting		397	543	295	1,658	1,941	1,686	1,799	1,689	1,973		
Boring	67	131	124	42	227	327	416	493	606	643		
Planers	233	303	173	5	218	271	343	326	380	453		
Shapers	833	3,172	2,048	628	2,561	2,855	3,147	3,493	3,721	3,559		
Slotting	46	250	158	20	104	169	309	419	540	505		
Broaching		44	68	5	179	272	199	224	273	307		
Grinding	254	1,839	2,094	1,832	3,574	4,049	3,185	3,369	3,432	3,959		
Sharpening	221	2,045	4,268	907	1,575	1,700	1,516	1,635	1,543	1,864		
Vertical-drilling	6,838	12,235	15,251	7,168	9,889	11,022	12,962	19,014	22,098	24,921		
Radial-drilling		585	610	43	870	1,123	1,388	1,677	1,725	2,000		
File cutting					138	90	10					
Special, specialized, and those employing standardized components		962	6,688	5,046	8,623	7,560	7,009	8,233	9,533	16,685	21,800	
Other	2,503	5,365	7,061	4,673	10,719	10,270	11,435	15,460	17,381	17,238		
From the Total Number of Metal-Cutting Machine Tools												
Precision			17	17	2,744	3,179	3,159	4,468	5,161	5,860		
Large, heavy, unique		23	212	42	1,537	1,714	1,691	2,338	2,849	3,540	3,733	

Sources: Production figures for 1928-55 period: TSentral'noye Statisticheskoye Upravleniye pri Sovete Ministrov SSSR, Promyshlennost' SSSR, Statisticheskiy sbornik, Moscow, Gosstatizdat, 1957, p. 207-209
Production figures for 1956: Tsentral'noye Statisticheskoye Upravleniye pri Sovete Ministrov SSSR, Narodnoye khozyaystvo SSSR v 1956 godu, Statisticheskiy yezhegodnik, Moscow, Gosstatizdat, 1957, p. 60; "Sovetskoye..." op.cit., p. 3; Production figures for 1957: Izvestiya, 28 Jan. 1958, p. 2

Status of the past and present operating stock of machine tools. A detailed scrutiny of official Soviet statistics dealing with annual domestic production and imports of machine tools from Germany, France, England, and the United States, combined with a check of machine tool stocks accumulated as of January 1, 1932, January 1, 1941, and January 1, 1956, reveal significant discrepancies, which so far have not been pointed out in U. S. technical and economic publications. The following table brings together data on existing stocks, production, imports and losses due to war, etc.:

TABLE IV

SOVIET MACHINE TOOL STOCKS, ANNUAL PRODUCTION, IMPORTS AND WAR LOSSES

A		B		C	D
Total Stock of Machine Tools	Year	Machine Tools Produced in USSR		Machine Tools Imported from Abroad	War Losses, etc.
Date:					
1 Jan. 1932: 181,000	1932	19,720		68,950	
	1933	21,000		23,730	
	1934	25,400		18,397	
	1935	33,900		12,435	
	1936	44,400		4,888	
	1937	48,473		4,790	
	1938	55,300		n.a.	
	1939	55,000		n.a.	
	1940	58,437		n.a.	
1 Jan. 1941: 710,000	Total	361,630		132,990	
	1941	29,000			
	1942	10,000	estimate	21,745	(175,000)
	1943	20,000			
	1944	25,000			
	1945	38,419		n.a.	
	1946	40,300		n.a.	
	1947	50,400		n.a.	
	1948	64,500		n.a.	
	1949	64,900		n.a.	
	1950	70,597		n.a.	
	1951	71,182		n.a.	
	1952	74,558		n.a.	
	1953	91,759		n.a.	
	1954	102,362		n.a.	
	1955	117,087		n.a.	
1 Jan. 1956:1,760,000	Total	870,064		21,745	175,000
	Grand Total	1,231,694		154,735	175,000

Sources: Column A - 1932: Omarovskiy, op.cit., p. 234; 1941 and 1956: Narodnoye khozyaystvo SSSR v 1956 godu, p. 60
Column B - 1932-1940, 1945-1956: Ibid, p. 60; 1941-1944: Estimate
Column C - 1932-1937: calculated on Omarovskiy, op.cit., p. 50
1941-1944: Ropes, E. C., "United States Trade with Russia (U.S.S.R.) During War Years" in International Reference Service, no. 41, Dec. 1945, p. 7; 1945: "U. S. Trade with U.S.S.R. During Calendar Year '45" in Foreign Commerce Weekly, 29 June 1946, p. 31
Column D - Voznesenskiy, N. Voyennaya ekonomika SSSR v period Otechestvennoi Voiny, Moscow, OGIZ-Gospolitizdat, 1948, p. 160

It is apparent that somewhere along the line there is a misrepresentation of statistical data. According to the Soviets the total stock of machine tools in the U.S.S.R. between January 1, 1932, and January 1, 1956, rose from 181,000 to 1,760,000 giving a net gain of 1,579,000 units. During the same period of time the domestic production accounted for 1,231,694 units and imports for 154,735 units. Subtracting war losses of 175,000 machine tools, this leaves us with 1,211,429 units officially accounted for. Unaccounted for are 367,571 machine tools which the Soviets claim to have but never admitted the manner of acquisition. At this point the author would like to stress that in his calculations he assumes that all machine tools either produced or imported into the U.S.S.R. are still in an operating condition. This is an untenable assumption considering the fact that the number of unskilled tool operators in the U.S.S.R. was and still is extremely high, and that the productivity of the Soviet machine tool operator is much lower than that of his American counterpart. 10/ Untenable as it may sound, official figures of the Central Statistical Administration show that as of January 1, 1956, the total stock of Soviet machine tools consisting of 1,760,000 units, included 18.2 percent, or about 320,320 units of the pre-1936 vintage. 11/

10/ Ganshtak, V. I., Ocherki po ekonomike mashinostroitel'noy promyshlennosti SSSR, Moscow, Mashgiz, 1957, p. 413

11/ Prokopovich, A. Ye., Tekhnicheskiy progress v stankostroyenii, Moscow Moskovskiy Rabochiy, 1957, p. 133

Considerable portion of the 367,571 "unaccounted" machine tools were acquired by the U.S.S.R. as result of a ruthless industrial pillage of Austria, Czechoslovakia, Eastern Germany, Hungary, Poland, and Manchuria. The extent of the pillage cannot be ascertained, but taking into consideration the fact that Germany during the latter phases of World War II moved large numbers of tools (some looted from France, Belgium and other areas) into rearward areas to escape Allied bombings, we can safely assume that the bulk of these were taken by the Soviets as "war reparations," etc. The balance of the "unaccounted" machine tools was most likely supplied by Czechoslovakia, Hungary, and East Germany, whose production of machine tools is steadily rising, and whose principal markets are in the U.S.S.R. The Soviets never admitted that they import large numbers of machine tools from Czechoslovakia. Quite in contrary, they state that machine tool imports in 1946 consisted of 581 units, in 1950 of 401 units, and in 1956 945 units. 12/ During 1956, Czechoslovakia produced 21,000 machine tools, and it is planning for production of 34,000 units in 1960. 13/ Since the Czechoslovak demand for machine tools consists of only a portion of these figures cited above, we can safely assume that the Soviet Union imports significantly more units than it officially admits.

12/ Moiseyenko, V., "Razvitiye torgovykh svyazey Sovetskogo Soyuza s Cheskoslovatskoy Respublikoy," in Vneshnyaya Torgovlya v 23, no. 1, 1958, p. 4

13/ Gruzinov, V., "Torgovlya Chekhoslovakii promyshlennym oborudovaniyem," in Vneshnyaya Torgovlya, v. 27, no. 12, 1957, p. 24

Between January 1, 1956, and January 1, 1957, the total stock of machine tools rose from 1,760,000 to 1,840,000 units, a net gain of 80,000 units. 14/ During the same period, the Soviet industry produced 121,300 units. 15/ It is difficult to estimate how many of these units were considered as completed, but have not left the machine-building plants. Since the demand for machine tools is great we can only assume that completed units are utilized almost immediately without being stored for a prolonged time in warehouses of producing plants. During 1957, the Soviet machine-tool building industry turned out approximately 130,000 machine units. 16/ According to Prokopovich, the production of 200,000 units by 1960 will closely approach the U. S. production of machine tools in 1952, when the industry turned out about 230,000 units of all types. 17/

A cursory examination of available data show that either the replacement of outmoded equipment or modernization (rebuilding) of machine tools practically does not exist in the U.S.S.R. During the past ten years few if any machine tools were scrapped and replaced by new units and only about 60,000 machine tools were modernized. 18/

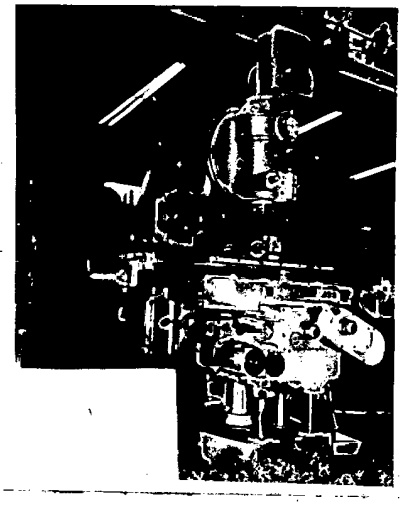
14/ Narodnoye khozyaystvo..., p. 58
15/ Ibid., p. 60
16/ Izvestiya, 28 Jan. 1958, p. 2
17/ Prokopovich, op.cit., p. 10
18/ Ibid., p. 135

The modernization consisted primarily of increasing spindle speeds and power and hardly touched the mechanization and automation of equipment. It is of some significance that the Sixth FYP provides for modernization of about 22 percent of the operating stock (as of 1 Jan. 1956). 19/ Should such a bold plan succeed, the modernization would encompass practically all the machine tools in Soviet stock of the pre-1939 vintage.

Since most of the machine tools looted from Central Europe were of the pre-1939 vintage, it is quite safe to assume that about one-half of the present operating stock is more than 18 years old. In contrast, the average life before obsolescence of a machine tool in the United States ranges between 7 to 10 years. This explains the fact that the productivity of the Soviet industrial worker is only about 40 percent of that of his American counterpart and it is not expected to rise above 60 percent by 1960. 20/

The Growth of Number of Machine-Tool Types. In the beginning of the Second FYP, the Soviets were producing about forty types of machine tools of a relatively simple design (with cone pulley drives) chiefly to satisfy the needs created by machine building program in general and to some extent for replacement of shop worn equipment. Prior to the outbreak of World War II, Soviet plants not only

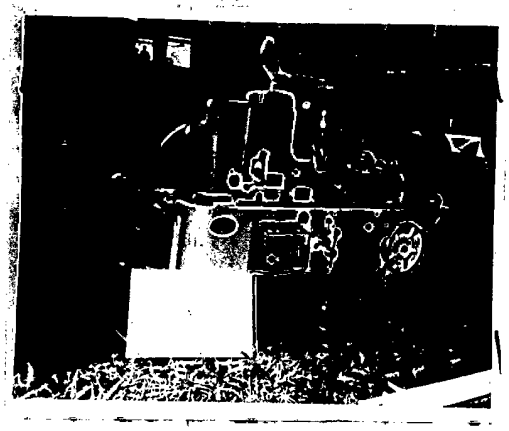
19/ Prokopovich, op.cit., p. 142
20/ Satel', E. A., Osnovy organizatsii i planirovniya mashinostroitel'nykh predpriyatii SSSR, Moscow, Mashgiz, 1957, p. 20



Model 6N12P
Vertical Milling Machine

stepped up numerically the output of machine tools, but also increased the number of types of machines produced to more than two hundred. This increase was primarily noted among general purpose and special machine tools. These achievements were demonstrated during the All-Union Exposition of Machine Tools held in Moscow in 1938. 21/

During the 1934-40 period, machine tools using standardized components designed by ENIMS and built by the "Stankokonstruktsiya" plant played an important role in the mechanisation and automation of machine-building processes and also in the introduction of mass production methods. With the organizational period ending in 1937, the industry entered the phase of independent technical growth, relying less and less on the aid from the West. The production of automatic and semi-automatic, gear-cutting, broaching, milling, and special purpose machine tools for plants employing mass-production methods rose sharply during the



Model 5822
Universal Thread Grinding Machine

21/ "Sovetskoye stankostroyeniye k 40-letyu Velikoy Oktyabr'skoy sotsialisticheskoy revolyutsii," in Stanki i Instrument, no. 10, Oct. 1957, p. 2

NOTE: Photographs show some of the Soviet machine tools exhibited at the Brussels Fair.

Model 1272
Vertical Six-Spindle Semi-Automatic Lathe

latter part of the Second and the first two years of the Third FYP's. In 1938, the Soviets began production of heavy lathes, boring and planing machines, and practically completed the transition from cone pully to individual drives on newly produced equipment. 22/

The outbreak of war between the U.S.S.R. and Germany made considerable changes in the assortment of machine-tool types produced, since the demand centered on efficient, simple, and general purpose machines. During the latter part of the war, with the receding tide of German conquest, plans were already made for production of machine tools for plants in liberated areas. Consequently, the Fourth FYP witnessed an increase in the number of specialized, special, heavy and precision machine tools, geared for reconstruction of transportation, industrial, and agricultural equipment. The production of precision machine tools in 1955 reached 5860 units in comparison with 2,744 units in 1950, and 17 units in 1940. 23/

Model LR-87
Boring Machine

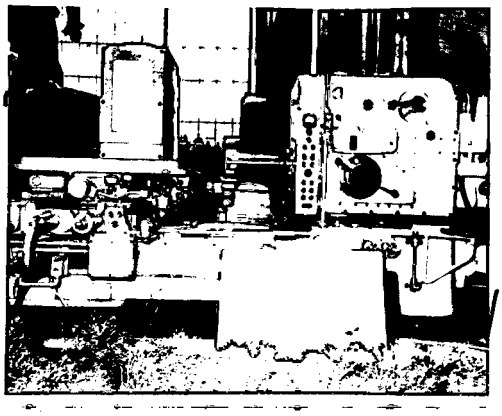
22/ "Sovetskoye stankostroyeniye k 40-letyu Velikoy Oktyabr'skoy sotsialisticheskoy revolyutsii," in Stanki i Instrument, no. 10, Oct. 1957, p. 2

23/ See TABLE III

Wide introduction of automated mass flow production processes, created during the Fifth FYP a great demand for special equipment and machine tools using standardized components and automatic machine-tool lines. The 1956 production of these tools reached 21,800 units in contrast with 8,600 units in 1950. During the 1950-56 period, the industry produced 1257 new more important types of machine tools, of which about 40 percent appear to be either automatic or semi-automatic. 24/

Model 6Ñ42P
Milling Machine

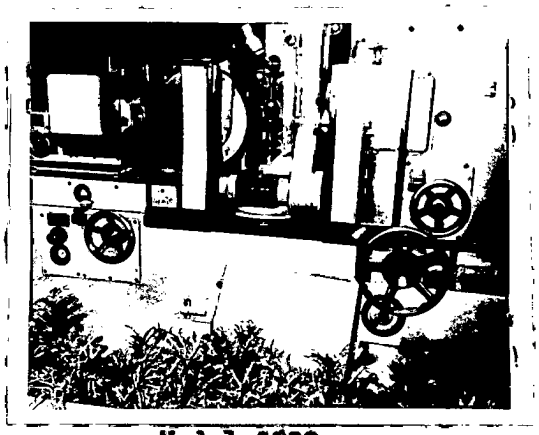
Extent of Automation of Production Processes. A significant contribution to the automation of production processes appears to be the complex automation of automobile cylinder block production as exemplified by the practices of the Moscow Automobile Plant ZIL (Zavod im. Likhachev). One of its automated lines consists of four vertical, four horizontal, and six inclined drilling and boring, and thread-cutting machines. The line is powered by twenty electric motors, with a total capacity of 85 kw. At present the line is serviced by three



Model 262PR
Horizontal Borer

24/ "Sovetskoye...," op.cit., p. 3

workers in contrast with fifty-six which were required to perform identical operation prior to automation. 25/ During the past ten years the Soviet industry introduced more than ninety automated lines, among them those installed in the Moscow Automobile Plant ZIL, Kharkov Tractor Plant, Moscow First State Bearing Plant, and Altay Plant for Agricultural Machinery are the most outstanding examples. 26/ According to data from the "Volta" Plant producing electrical equipment, etc., automatic lines for turning out shafts increased the productivity of workers more than seven times, which permitted the reduction of operating personnel to one-fourth of that needed prior to automation. 27/



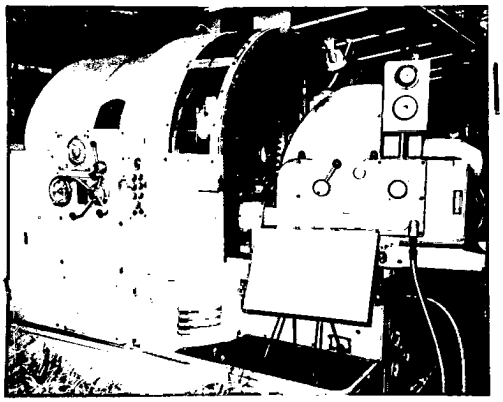
Model 5833
Semi-Automatic Grinder

The Moscow First State Bearing Plant, recently visited by Western observers, has an automatic line for machining races, coating with anticorrosives, assembling, and packaging of bearings. The equipment of this line consists of eighty-four units, of which sixty-nine are machine tools. 28/

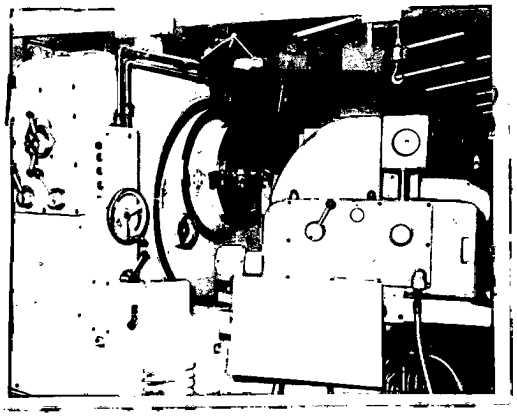
The plans of the Sixth FYP include a project for augmenting the production of automatic and semi-automatic machine tools suitable for inclusion into automatic lines. As of 1 January 1956, the share

25/ Satel', op.cit., p. 154
26/ Ibid., p. 153
27/ Pagodin, A. A., "Tekhnicheskiy progress sovetskogo stankostroyenya," in Stanki i Instrument, no. 10, Oct. 1957, p. 6
28/ Satel', op.cit., p. 154; also Pagodin, op.cit., p. 6

of automatic tools in the total machine tool stock of the U.S.S.R. was only about 6.5 percent, of which about 8 percent were employed in machine building other than machine tool, 9.7 percent in machine-tool building and 19 percent in the automobile industry. 29/ Throughout 1957, the EMIS was carrying out an intensive research in order to devise typical automatic lines for production of spur and bevel gears, tapered and splined shafts, and other parts of a general machine-building nature. Each of these lines would permit machining of parts considerably varying in size; resetting of the line would take no longer than two to three hours. 30/ All in all, automation of this sort will undoubtedly help the Soviets to overcome many of their industrial ills, one of them is to make up for a lack of skilled workers, and the other to increase their productivity.



Model 5872
Semi-Automatic Bevel & Spiral
Gear Generator



Model 528S
Semi-Automatic Bevel
Gear Generator

29/ Prokopovich, op.cit., p. 56; also Kazakov, N. F., "Vazhneyshiye zadachi mashinostroyeniya," in Vestnik Akademii Nauk SSSR, v. 26, no. 12, Dec. 1956, p. 104-107

30/ Pagodin, op.cit., p. 6

Concluding Remarks. It is not the purpose of this preliminary survey to placate the "alarmist," who daily both extols and bemoans Soviet industrial strides, nor to awaken the uninterested or those who underestimate the Soviet industrial capacity. Production figures, such as those quoted by the Soviets, should always be looked upon and examined in an analytical and objective perspective. True, the reported production figures for Soviet machine tools during 1955 compared with those for the United States seemingly show that the Soviets outstripped us in that respect by a fairly wide margin. However, a brief insight into what lies behind these Soviet figures shows that the "alarmist" should restrain his extolment and that the habitual "down grader" should reconsider his estimates and assume objective attitudes towards the Soviet industrial prowess. It is true that tool for tool the Soviets produced in 1955 more than we did, but what kind and how modern are these tools!

The overall production of metal-cutting machine tools in 1955 in the U. S. and the U.S.S.R. reached approximately 106,000 and 117,000 units respectively. The figure of 106,000 units[31/] for the United States excludes home workshop, service-shop, garage, etc. equipment, while the Soviet figure of 117,000 units includes presumably all types of metal-cutting machine tools, large and small. The qualification "presumably" is based on the fact that prior to 1939, the Soviets in reporting their annual production of machine tools, as a rule excluded small machine tools. For instance, in 1934 the

31/ U. S. Bureau of Census, Statistical Abstract of the United States, Washington, 1957, p. 803

Soviets produced about 21,100 large and 4,300 small units; in 1937 - 36,000 large and 12,400 small units; in 1938 - 39,200 large and 14,700 small units. 32/ The Soviet statistical abstract published in 1957 does not even mention these two figures and presents only the totals for these years, thus giving grounds for an assumption that the post-war production figures include perhaps up to 25 percent of machine tools of service-shop and garage variety. Should this assumption be correct, the Soviets even at present time are producing machine tools only at a rate of about 100,000 units per annum.

The second question as to how modern Soviet machine tools are, can be answered by comparing Soviet machine tool specifications with those of the United States. It may be reasonably assumed that the bulk of current models turned out by the Soviet industry approach in makeup, speeds, rate of feeds, etc. the U.S. models made during the late thirties and during World War II. Since then the United States has made considerable advances in machine tool technology, and through introduction of tungsten carbide tooling, the U. S. has increased the productive capacity of modern machine tools two to five times. The figure of 106,000 units produced in 1955 does not represent the capacity of the U. S. machine tool industry, which during the height of World War II turned out more than 300,000 units. At present the industry is basically reproducing

32/ Figures for 1934 - Gosplan, SSSR, Sotsialisticheskoye stroitel'stvo SSSR, Moscow, Soyuzorguchet, 1936. p.157
1937 - Gosplan SSSR, Itogi vtorogo pyatiletnego plana, Moscow, Gosplanizdat, 1939, p. 77
1938 - Gosplan SSSR, Sotsialisticheskoye stroitel'stvo SSSR. (1933-1938), Moscow, Gosplan., 1939, p.64

itself, is phasing out obsolete equipment and is producing highly efficient modern units for the industry. Even at present low rates of production the United States industry is turning out annually machine tools which in their total productive capacity exceed by at least 50 percent the total productive capacity of Soviet machine tools. Substantiation of the above statement can be found in a recently released Soviet study of Methods of Measurement of Labor Productivity in Industry,[33] which among others outlines the basic shortages of the Soviet industry and repeatedly makes references to shortages of certain categories and low productivity of Soviet machine tools. Since this has a definite bearing on the topics discussed in this article, the author presents in the following paragraphs a translation of pertinent statements made in the study.

> "...Numerous (Soviet) machine-building enterprises produce equipment and machine tools, especially metal cutting machine tools, of an old design, characterized by low speeds (400 to 800 r.p.m.), despite the fact that in most advanced capitalistic countries (and also in the USSR) machine tools are produced capable of speeds of 1,500 to 3,000 r.p.m. Many branches of the Soviet economy experience shortages of automatic machine tools, especially multi-tool and fine grinding machine tools, and of modern press forging equipment. This (shortage) prevents the transition from mechanical working of metal to a much more economical stamping. Automatic molding equipment produced abroad is three to four times more productive than that used in the Soviet Union. The quality of Soviet production is below that of the West not only in machine tool building, but also in transport and agricultural machinery building, in electric power equipment (low pressure and heating temperatures of boilers, old design of furances), in design of textile machinery, instrument making, radio equipment, etc. ..." [34]

33/ Rotshteyn, A. I., Metody izmereniya proizvoditel'nosti truda v promyshlennosti, Moscow, Gosstatizdat, 1957, p. 26-31

34/ Ibid., p. 26

"In many instances, the produced machines are inferior to foreign-made in terms of speeds, weights, productivity, and automation of control, all of these factors contributing to excessive losses. Furthermore, the following machines of a modern design are introduced into production at a very slow rate: multi-tool metal cutting automatic machine tools, gear-cutting and grinding machines, hydraulic presses, automatic rolling mills, etc. 35/

"...Above else, existing equipment is not modernized. Machine building plants do not cooperate with other enterprises and consequently modernization is carried out on a haphazard basis - only when it coincides with a general repair and maintenance schedule of machines. Where machine tools were modernized, productivity rose 15 to 30 percent (Leningrad plants "Metallist," im. K. Marx, and im. Sverdlov). Modernization of machine-tools more than 20 years old and currently employed by the First State Bearing Plant (Moscow), increased their productive capacity by 25 percent..." 36/

"...In many machine-building plants, machine tools and presses are utilized only to 30-40 percent of their productive capacity. In the middle of the Fifth Five-Year Plan, the Leningrad plants "Metallist" and im. Sverdlov utilized only 32 and 30 percent of their machine tool stocks respectively, the Novocherkassk electric motorcar plant from 21 to 46 percent, etc. In many enterprises 13 to 15 percent of machine tools are idle..." 37/

"The struggle with so-called "hidden" idleness plays a significant role in the utilization of machine tools, which under conditions of large series production are used only 50 to 60 percent of the alloted running time, and under conditions of small series or individual production even less. Lathes, in a number of cases, are utilized 30 to 45 percent of the alloted running time, the remaining machine time is used for manual operations: 12 to 25 percent for preparatory and finishing operations, 21 to 34 percent for auxiliary, and 6 to 10 percent for servicing the working area. This causes considerable interruptions in the operation of machine tools and these interruptions become longer with increased speeds of machine tools, since they require more frequent changes of machined piece parts. Here into the picture enters automation and mechanization of equipment and jigs which could reduce the time required for taking off, clamping, and measurement control checking of machined parts, thus increasing the productivity of labor, especially on high-speed, universal semi-automatic machine tools. But these have not found a wide

36/ Rotshteyn, A. I., Metody izmereniya proizvoditel'nosti truda v promyshlennosti, Moscow, Gosstatizdat, 1957, p. 26-31

37/ Ibid., p. 28

application. An important factor contributing to the "idleness" of equipment is the non-observance (violation) of maintenance schedules and also a poor organization of the latter..."

"The effectiveness of machine utilization is also lowered by the absence of complex mechanization or because of violation of its principles. Quite often, only main operations are mechanized and secondary operations such as transport, maintenance, preparation of tools are carried out by hand and require large expenditures of labor..."

"In many plants producing complex and powerful machines and apparatus requiring mass production lines and automatic tools, the feeding (podacha) of heavy parts, unloading of raw materials, and other secondary operations are carried out haphazardly, sometimes by skilled labor diverted from their primary duties. Under these conditions, in the technological chain of operations, there are non-mechanized labor-consuming processes which sharply violate the principle of uniform development of production. Partial mechanization and automation, as a rule, does not produce the desired effect. Absence of "small mechanization" almost always effects the operations of main shops, causing in many instances an interruption in operations, inadequate loading of equipment, consequently a "crash program" to catch up, followed usually by "breakdowns." One of the contributing causes to this state of affairs is the absence (in the Soviet Union) of machine and equipment complements for a uniform mechanization of not only of primary but also of auxiliary sectors of production..." 38/

These are the Soviet industrial ills which cannot be cured overnight and which were conveniently forgotten by numerous Western politicians and economists, to whom the launching of Sputnik meant progress in all lines of Soviet endeavour. The fact remains that Soviet industrial progress is handicapped by slipshod practices and operations. Despite her claim to industrial prowess and her astuteness in the statistical game of numbers, the Soviet Union still remains and will remain for some time to come well behind the United States in machine tool production. Remarks made recently by Mr. Khrushchev in Berlin

38/ Rotshteyn, A. I., Metody izmereniya proizvoditel'nosti truda v promyshlennosti, Moscow, Gosstatizdat, 1957, p. 29-30

that the Soviet Union is catching up with the industrial production of the United States appear highly questionable, to put it mildly when one goes beyond the Soviet Statistical Abstract in search for true data on the growth and development of the Soviet industry.

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Comment

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REFERENCES

1/ "Sovetskoye stankostroyeniye k 40-letiyu velikoy Oktyabr'skoy sotsialisticheskoy revolyutsii," in Stanki i Instrument, v. 28, no. 10 (Oct. 1957) p. 1
2/ Ibid., p. 1
3/ Berri, L. Ya., Spetsializatsiya i kooperirovaniye v promyshlennosti SSSR, Moscow, Gospolitizdat, 1954, p. 244
4/ "Sovetskoye..." op.cit., p. 2
5/ Omarovskiy, A., Sovetskoye stankostroyeniye i ego rol v industrializatsii strany, Moscow, Akademiya Obshchestvennykh Nauk pri TsK VKP(b), 1948, p. 60
6/ Ibid., p. 64
7/ "Sovetskoye..." op.cit., p. 2
8/ Ts.U.N.Kh.U., Gosplan SSSR, Summary of the Fulfillment of the First Five-Year Plan for the Development of the U.S.S.R., Moscow, Gosplan, 1933, p. 76-77
9/ Bakulin, S. N. and D. D. Mishustin, Vneshnyaya torgovlya SSSR za 20 let, 1918-1937, Moscow, Mezhdunarodnaya kniga, 1939. p. 79-80
10/ Ganshtak, V. I., Ocherki po ekonomike mashinostroitel'noy promyshlennosti SSSR, Moscow, Mashgiz, 1957, p. 413
11/ Prokopovich, A. Ye., Tekhnicheskiy progress v stankostroyenii, Moscow Moskovskiy Rabochiy, 1957, p. 133
12/ Moiseyenko, V., "Razvitiye torgovykh svyazey Sovetskogo Soyuza s Cheskoslovatskoy Respublikoy," in Vneshnyaya Torgovlya v 23, no. 1, 1958, p. 4
13/ Gruzinov, V., "Torgovlya Chekhoslovakii promyshlennym oborudovaniyem," in Vneshnyaya Torgovlya, v. 27, no. 12, 1957, p. 24
14/ Narodnoye khozyaystvo..., p. 58
15/ Ibid., p. 60
16/ Izvestiya, 28 Jan. 1958, p. 2
17/ Prokopovich, op.cit., p. 10
18/ Ibid., p. 135
19/ Ibid., p. 142
20/ Satel', F. A., Osnovy organizatsii i planirovniya mashinostroitel'nykh predpriyatii SSSR, Moscow, Mashgiz, 1957, p. 20
21/ "Sovetskoye stankostroyeniye k 40-letiyu Velikoy Oktyabr'skoy sotsialisticheskoy revolyutsii," in Stanki i Instrument, no. 10, Oct. 1957, p. 2
22/ Ibid., p. 2
23/ See TABLE III
24/ "Sovetskoye..." op.cit., p. 3
25/ Satel', op.cit., p. 154
26/ Ibid., p. 153
27/ Pagodin, A. A., "Tekhnicheskiy progress sovetskogo stankostroyenya," in Stanki i Instrument, no. 10, Oct. 1957, p. 6

References (cont.)

28/ Satel', op.cit., p. 154; also Pagodin, op.cit., p. 6
29/ Prokopovich, op.cit., p. 56; also Kazakov, N. F., "Vazhneyshiye zadachi mashinostroyeniya," in Vestnik Akademii Nauk SSSR, v. 26, no. 12, Dec. 1956, p. 104-107
30/ Pagodin, op.cit., p. 6
31/ U. S. Bureau of Census, Statistical Abstract of the United States, Washington, 1957, p. 803
32/ Figures for 1934 - Gosplan, SSSR, Sotsialisticheskoye stroitel'stvo SSSR, Moscow, Soyuzorguchet, 1936. p. 157
1937 - Gosplan SSSR, Itogi vtorogo pyatiletnego plana, Moscow, Gosplanizdat, 1939, p. 77
1938 - Gosplan SSSR, Sotsialisticheskoye stroitel'stvo SSSR, (1933-1938), Moscow, Gosplanizdat, 1939, p. 64
33/ Rotshteyn, A. I., Metody izmereniya proizvoditel'nosti truda v promyshlennosti, Moscow, Gosstatizdat, 1957, p. 26-31
34/ Ibid., p. 26
35/ Ibid., p. 27
36/ Ibid.
37/ Ibid., p. 28
38/ Ibid., p. 29-30

Sources for TABLE I: Tsentral'noye Statisticheskoye Upravleniye pri Sovete Ministrov SSSR, Promyshlennost' SSSR. Statisticheskiy sbornik, Moscow, Gosstatizdat, 1957, p. 55, 60, 62, 64, 65, 66, 68, 72, 81, 85, 91, 95

TABLE II: Column (1), 1923-37, Omarovskiy, op.cit., p. 50; column (2), 1923-31, Ibid., p. 65; column (2), 1932-37, Ts.S.U., Promyshlennost'... 1957, p. 207-209

TABLE III: Production figures for 1928-55 period: Tsentral'noye Statisticheskoye Upravleniye pri Sovete Ministrov SSSR, Promyshlennost' SSSR. Statisticheskiy sbornik, Moscow, Gosstatizdat, 1957, p. 207-209
Production figures for 1956: Tsentral'noye Statisticheskoye Upravleniye pri Sovete Ministrov SSSR, Narodnoye khozyaystvo SSSR v 1956 godu. Statisticheskiy yezhegodnik, Moscow, Gosstatizdat, 1957, p. 60; "Sovetskoye..." op.cit., p. 3
Production figures for 1957: Izvestiya, 28 Jan. 1958, p. 2

References (cont.)

Sources for TABLE IV: Column A - 1932: Omarovskiy, op.cit., p. 134; 1941 and 1956: Narodnoye khozyaystvo SSSR v 1956 godu, p. 60

Column B - 1932-1940, 1945-1956: Ibid., p. 60; 1941-1944: Estimate

Column C - 1932-1937: calculated on Omarovskiy, op.cit., p. 50

1941-1944: Ropes, E. C., "United States Trade with Russia (U.S.S.R.) During War Years" in International Reference Service, no. 41, Dec. 1945, p. 7; 1945: "U. S. Trade with U.S.S.R. During Calendar Year '45" in Foreign Commerce Weekly, 29 June 1946, p. 31

Column D - Voznesenskiy, N., Voyennaya ekonomika SSSR v period Otechestvennoi Voiny, Moscow, OGIZ-Gospolitizdat, 1948, p. 160

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